

72735
Impact Melt Breccia
51.1 grams



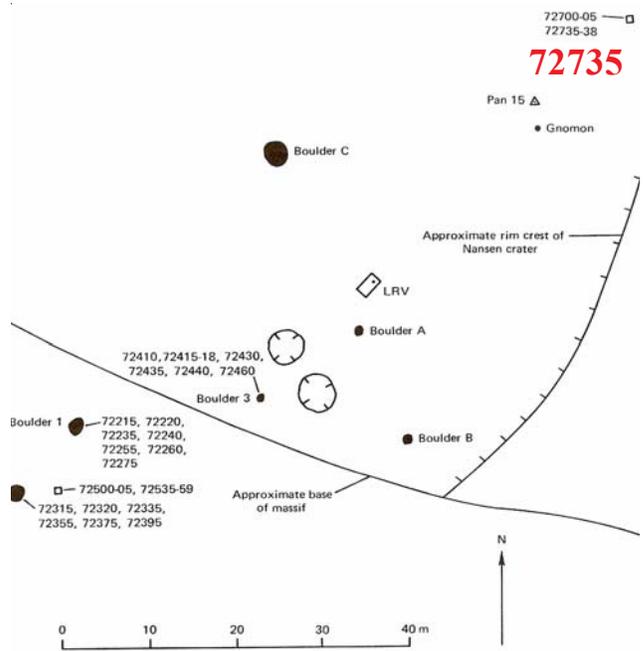
Figure 1: Photo of rake sample 72735 showing micrometeorite crater that nearly broke the sample. Scale and cube are 1 cm. NASA S73-19442. Note that if the micrometeorite had been a little larger or faster, we would have two samples!

Introduction

Rake sample 72735 has an unusual chemical composition. It has very high Rb and Zr! And it has low Mg/Fe and high Al.

72735 is rounded and pitted on all sides by exposure to space (figure 1). It was collected as a rake sample about 40 meters north of station 2 along with soil sample 72700 (see map).

Interestingly, Ryder and Dalrymple (1996) hypothesized that 72735 may be the one melt rock that is NOT ejecta from Serenitatis. So far, this hypothesis has not been tested.



Station 2, Apollo 17

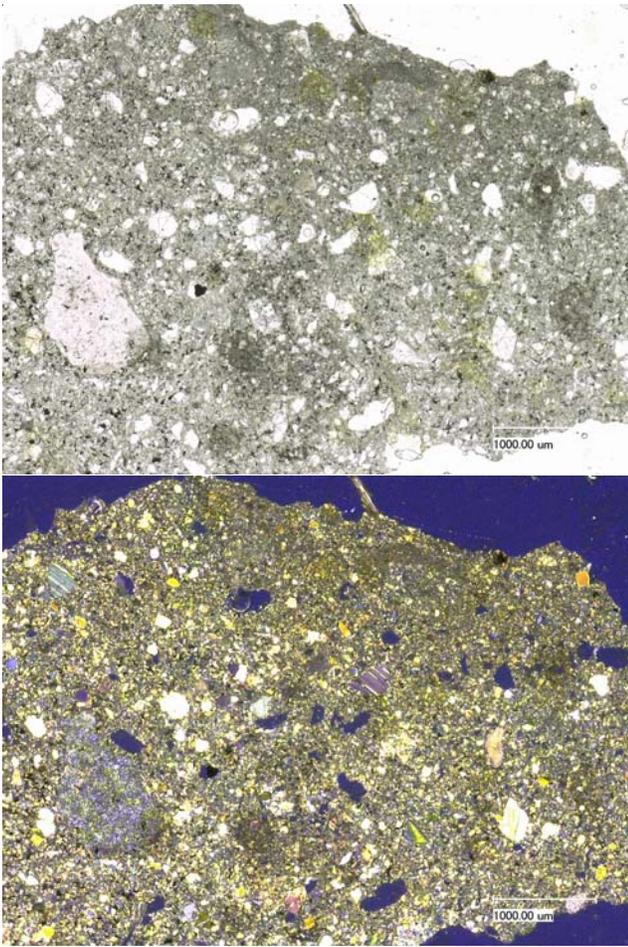


Figure 2: Photomicrographs of thin section 72735,12 by C Meyer @50x.

Petrography

Warner et al. (1978) and Ryder (1993) describe 72735 as a crystalline matrix breccia. “Most of the plagioclase present in the matrix occurs in fine patches rather than as whole grains. Tiny patches of a K-rich interstitial silicate phase are common, particularly within the fine-grained plagioclase areas. Analyses of this phase in 72735 show it to be K-feldspar. Ilmenite is the chief opaque mineral and is present as rods or equant grains several microns wide or as irregular micropoikilitic crystals.” Chromite, rutile and baddelyite, troilite and metal are present in the matrix. Pyroxene and olivine composition is given in figure 4 and trends towards Fe enrichment.

Warner et al. (1978) briefly describe a variety of small clasts. One clast (figure 3) has “a cumulate texture, with 0.1-0.2 mm anhedral olivine (Fo₈₆) grains poikilitically enclosed by a few large (>1 mm long) plagioclase (An₉₂) crystals. The clast also contains one

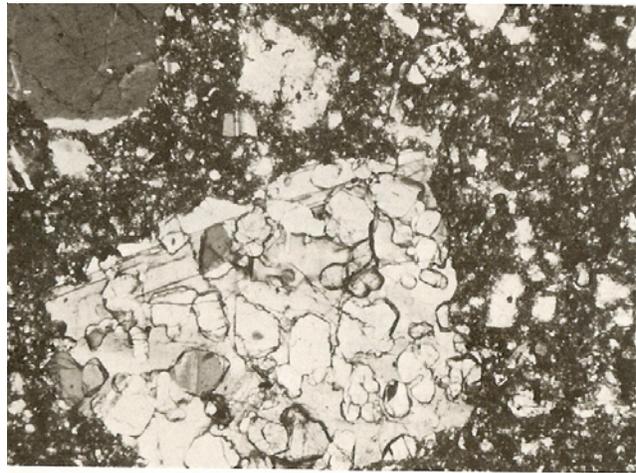


Figure 3: Troctolite clast in 72735 (from Warner et al. 1977).

~20 micron diameter crystal of pink spinel and trace amounts of ilmenite and chromite.”

Mineral Mode (Warner et al. 1977)

| | Vol. % |
|--------------------|--------|
| Matrix | 72.9 |
| Mineral clasts | 12.7 |
| Lithic clasts | 14.3 |
| Mineral clasts | |
| Plagioclase | 8 |
| Olivine/Pyroxene | 4.7 |
| Opaque | tr. |
| Metal/troilite | |
| Other | |
| Lithic Clasts | |
| ANT | 10.6 |
| Devit. Anorthosite | 2.4 |
| Breccia | 1.3 |
| Other | tr. |
| Percent of matrix | |
| Plagioclase | 52.7 |
| Olivine/pyroxene | 42.2 |
| Opaque | 1.2 |
| Metal/troilite | 0.3 |
| Other | 3.6 |

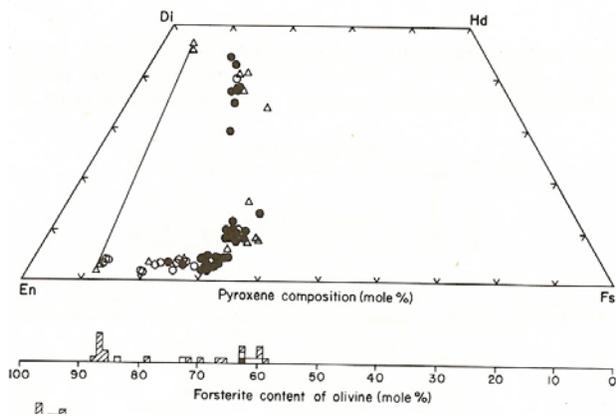


Figure 4: Pyroxene and olivine composition of 72735 (from Warner et al. 1977).

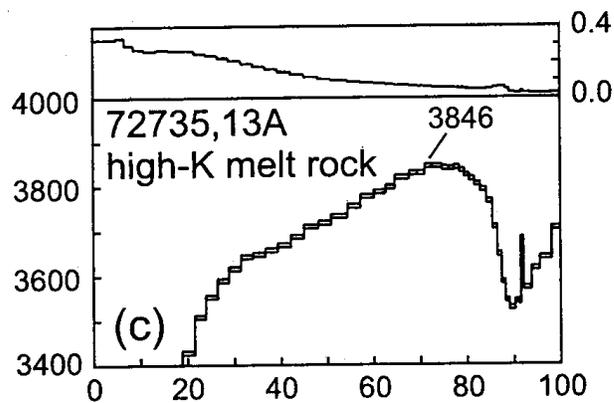


Figure 5: Argon39/40 release curve for 72735 (Dalrymple and Ryder 1996).

Chemistry

Dalrymple and Ryder (1996) repeated the analysis by Murali et al. (1977) and verified that this sample is “trace-element-rich” (table 1). The Rb content of 28 ppm is incredible!

Radiogenic age dating

Dalrymple and Ryder (1996) attempted to obtain the age of 72735 by the Ar/Ar plateau technique (figure 5). However, they did not get a good plateau and can only report that the sample is at least 3.85 b.y. old.

Processing

There is only one thin section of 72735.

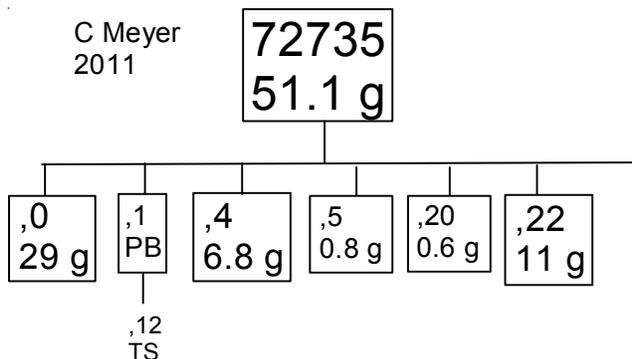


Table 1. Chemical composition of 72735.

| reference weight | Dalrymple96 | Murali 77 | Warner77 |
|------------------|-------------|-----------|--------------|
| SiO2 % | 48.2 | (a) | 50.1 (c) |
| TiO2 | 0.8 | (a) 0.7 | (b) 0.67 (c) |
| Al2O3 | 19.2 | (a) 18 | (b) 20.2 (c) |
| FeO | 9 | (b) 9.3 | (b) 7.9 (c) |
| MnO | 0.12 | (a) 0.12 | (b) 0.12 (c) |
| MgO | 8.9 | (a) 9 | (b) 8.1 (c) |
| CaO | 11.3 | (a) 10.2 | (b) 11.5 (c) |
| Na2O | 0.63 | (b) 0.54 | (b) 0.68 (c) |
| K2O | 0.82 | (b) 0.73 | (b) 0.89 (c) |
| P2O5 | | | |
| S % | | | |
| sum | | | |
| Sc ppm | 19.1 | (b) 16 | (b) |
| V | | 40 | (b) |
| Cr | 1432 | (b) 1230 | (b) |
| Co | 25 | (b) 17 | (b) |
| Ni | 167 | (b) 91 | (b) |
| Cu | | | |
| Zn | | | |
| Ga | | | |
| Ge ppb | | | |
| As | | | |
| Se | | | |
| Rb | 28 | (b) | |
| Sr | 162 | (b) | |
| Y | | | |
| Zr | 590 | (b) 880 | (b) |
| Nb | | | |
| Mo | | | |
| Ru | | | |
| Rh | | | |
| Pd ppb | | | |
| Ag ppb | | | |
| Cd ppb | | | |
| In ppb | | | |
| Sn ppb | | | |
| Sb ppb | | | |
| Te ppb | | | |
| Cs ppm | 0.88 | (b) | |
| Ba | 658 | (b) 560 | (b) |
| La | 48.3 | (b) 50.2 | (b) |
| Ce | 124.3 | (b) 127 | (b) |
| Pr | | | |
| Nd | 80 | (b) | |
| Sm | 21.4 | (b) 18.7 | (b) |
| Eu | 2.07 | (b) 1.87 | (b) |
| Gd | | | |
| Tb | 4.6 | (b) 3.9 | (b) |
| Dy | | 27 | (b) |
| Ho | | | |
| Er | | | |
| Tm | | | |
| Yb | 17.4 | (b) 15.1 | (b) |
| Lu | 2.4 | (b) 2.3 | (b) |
| Hf | 17.7 | (b) 23 | (b) |
| Ta | 2 | (b) 2.3 | (b) |
| W ppb | | | |
| Re ppb | | | |
| Os ppb | | | |
| Ir ppb | 7.8 | (b) 110 | (b) |
| Pt ppb | | | |
| Au ppb | 4.2 | (b) | |
| Th ppm | 9.1 | (b) 2.9 | (b) |
| U ppm | 2.64 | (b) | |

technique: (a) fused-bead, eprobe, (b) INAA, (C) broad-beam e-probe

References for 72735

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